

【What Is Claimed Is】

1. An automatic train protection stop device for controlling the train using data communication, comprising:

an on-board equipment including a main device having a plurality of circuits for implementing an ATS function and an ATP function, an on-board antenna integrated with a on-board coil and an oscillator, a rotary type speed detector connected to a shaft of wheel, an operation information displayer providing speed information, ground information, and operation information, a operation switch for selecting an operation mode, a train controller for controlling a brake of the train, and a communication module for transmitting on-board information and ground information to an central control system and receiving radio commands from the central control system; and

a ground equipment including a K-Balise for transferring the ground information using an ATS member connected to a track occupancy detector through narrow space data communication, and a program part for inputting ground information data to the K-Balise.

2. The automatic train protection stop device of claim 1, wherein the main device includes:

a speed analyzer for converting an output of the speed detector into an actual speed;

a self-applying frequency discriminator having a function of discriminating resonant frequency generated by dynamic reaction of an ATS beacon and an on-ground

antenna and constantly providing the self-applying frequency and discriminated current time information;

a target distance controller for receiving a corresponding section information (current signal information and rail information) when the on-board antenna approaches the ground K-Balise and train position and movement distance information so as to constantly calculate and provide a target distance and speed and a secure running speed of the train;

an operation controller for controlling all of the operations, providing information concerned to the operation, selecting an operation mode, setting a wheel diameter, communicating with the exterior device, and monitoring a speed calculation function of the speed analyzer;

an output controller for outputting the speed and current ATS information and contact point information for controlling excessive speed of the train on the basis of the ATP limit speed; and

an electric source converter for changing the electric source of the train into the electric source of the main device.

3. The automatic train protection stop device of claim 2, wherein the main device includes a GPS receiver for providing position information of the train using GPS.

4. The automatic train protection stop device of claim 2, wherein the main device includes an information recoding device for recoding and providing fixed and variable

information of corresponding sections.

5. The automatic train protection stop device of claim 2, wherein the main device includes an interface card which receives and processes international or intercontinental ground signals (track circuit signals) so as to provided the processed information and enables an internal or intercontinental train control between nations and continents of which signal standards.

6. The automatic train protection stop device of claim 2, wherein the target distance controller includes:

- a microprocessor for receiving various ground signals on the train and calculates the target distance information, target speed information, and limit speed information;
- an beacon information DB having beacon information; and
- a decoder for decoding the self-applying frequency discriminated by the self-applying frequency discriminator.

7. The automatic train protection stop device of claim 1, wherein the on-board antenna integrates the on-board member coil and the oscillator, outputs frequency and voltage variation signals, and transmits the ground information on the tract section by establishing a data communication network when approaching the K-Balise.

8. The automatic train protection stop device of claim 1, wherein the K-Balise

modulates the stored information by establishing the data communication network when the on-board antenna being approached and transmits the modulated information to the main device.

9. The automatic train protection stop device of claim 1, wherein the on-board antenna includes a demodulator having a first and a second coils (L1, L2) so as to generate a maximum output at the resonant frequency by connecting an output of a power amplifier and a capacitance (C1) to the first coil, enable to constantly oscillate by connecting the second coil to an input of the amplifier, and decoding the data transmitted at the K-Balise.

10. The automatic train protection stop device of claim 1, wherein the K-Balise includes a modulator, a micro control unit, a clock generator, and a storage device for forming a parallel resonant circuit of L3 and C3 so as to be oscillated by the frequency close to the oscillate frequency of the on-board antenna; and an analysis device for self-testing the operation state of the K-Balise and storing/maintaining the operation records.

11. The automatic train protection stop device of claim 1, wherein the operation information displayer includes a voice output alarm device for providing, in voice alarm, the operator with the speed information and ground information in the corresponding section using the GPS receiver and information recording device.

12. The automatic train protection stop device of claim 1, wherein the communication module communicates the information with the integral control system through a broadband data communication.

13. The automatic train protection stop device of claim 1, wherein the information recording device is a USB card or a flash memory card to/from which the fixed and variable information on the ground section can be written/read.

14. The automatic train protection stop device of claim 4 or claim 13, wherein the fixed information of the ground information recorded in the information recording device is the data including the rail condition such as a position of the beacon, geometrical situation, and the like; and the variable information of the ground information is the data including the information changing on and off such as a rail working area and movement of the rail work.